

STRICTLY CONFIDENTIAL

ENDICOTT

POUGHKEEPSIE

May 29, 1957

MEMO TO: J. S. Conzola

SUBJECT: Final WWAM Progress Report

As this is the final report on WWAM, several suggestions for future work are included in addition to stating the results of past efforts.

During the past five months, work on WWAM has been generally divided into four areas:

1) Components (transistors and diodes)

In the diode area, the Philips Corporation has now began production of type "AA" diodes. The Poughkeepsie Electrical Laboratory has approved the electrical characteristics of these units, and the French Laboratory will also review these units shortly.

In the transistor area, there are three vendors now producing units for the French market:

1. Philip's of Eindhoven, Netherlands (through its French subsidiary)
2. C. S. F. of Puteaux, France
3. Laboratoire Central de Telecommunication (L. C. T.) of Paris, France

The Philips Corporation feels that they will have $K = 0.35^{\circ}\text{C}/\text{mw}$ PNP units in production by the end of 1957 or $K = 0.26^{\circ}\text{C}/\text{mw}$ PNP units six to nine months later. Their NPN work is developmental and would lag PNP work by about three months on a production bases.

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The C. S. F. Corporation feels that they will have the desired NPN ($K < 0.30$) in production by the end of 1957. There would be a short time lag after this for the desired PNP.

Little is known about the L. C. T. Corporation other than the fact that they are now producing 2 Megacycle NPN units.

It is also interesting to note the points of our specifications which these vendors felt would be the most difficult to meet:

1. I_{co} for NPN units (26 μ a too low)
2. Breakdown for PNP units (15 volts instead of 20 v)
3. Frequency cutoff (perhaps 3.5 Mc. instead of 5 Mc.)
4. Maximum operating temperature (85° C too high)

Of course, it would be very profitable if we could relax any of these specifications.

2) Circuits

Mr. Boyer has developed a new set of circuits for the WWAM. The basic 10 volt signal swing is retained, but some of the changes include:

1. -60^v and +50^v load and diode returns.
2. Increased use of diode logic.
3. Use of 2 transistors, 6 diode triggers.
4. Use of a double inverter for a level setter.
5. A type of low-voltage switching in the control panel area.

On the basis of two diodes being the cost equivalent of one transistor, I do not feel that any cost reduction will be realized. I do not feel that a two transistor, 6 diode trigger is economical due to its reduced output capabilities. Also, the proposed low-voltage switching in the control panel area will not only be as costly as other methods but will also introduce the hazard of inductive noise pickup.

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It is difficult to further evaluate the circuit effort as information was made available only with some reluctance on the part of the Circuit Group (due, at least in part, to the tentative nature of the work).

3. Logic

Despite the fact that WWAM is a serial machine, the logical branching and length of logical chains make the optimum use of transistors difficult. (In fairness, however, it should be mentioned that the WWAM is not nearly as bad as some other proposed machines on this point). If cost is such an all important factor, perhaps the transistor is not the device that WWAM should be using (at least for early production). I do not feel that stripping the machine of all its expansion features or of some of its logical power is an adequate solution. I do think, however, that an accounting machine is very necessary for the market. Perhaps a tube and/or drum machine should be reviewed from the cost point of view.

4. Packaging (as related to circuits)

In order to affect some economy, the packaging group has decided to use a basic card printed on only one side. It seems that this approach will still allow sufficient space for all circuit layout. The wirewrap connections will be retained for reliability.

As stated before, I am a little concerned about inductive noise pickup in the control panel if the proposed circuit techniques are used.



M. J. Flynn

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